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United States Patent [19]**Mayhew et al.**[11] **Patent Number:** **5,965,159**[45] **Date of Patent:** **Oct. 12, 1999**[54] **ETHERLIPID-CONTAINING MULTIPLE LIPID LIPOSOMES**

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Related U.S. Application Data

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[51] Int. Cl.⁶ **A61K 9/127**

[52] U.S. Cl. **424/450; 428/402.2**

[58] Field of Search **424/450, 1.21, 424/9.321, 9.51; 428/402.2**

[56] **References Cited****U.S. PATENT DOCUMENTS**

3,752,886	8/1973	Munder et al.	424/199
4,159,988	7/1979	Eibl et al.	260/340.9
4,163,748	8/1979	Eibl et al.	260/403
4,382,035	5/1983	Eibl	260/403
4,734,225	3/1988	Eibl	260/386
4,804,789	2/1989	Eibl	568/853
4,920,016	4/1990	Allen et al.	424/450
4,965,391	10/1990	Counsell et al.	558/169
4,983,397	1/1991	Schroit et al.	424/450
5,013,556	5/1991	Woodle et al.	424/450
5,436,234	7/1995	Eibl	514/77
5,762,958	6/1998	Mayhew	424/450

FOREIGN PATENT DOCUMENTS

4132345	4/1993	Germany	A61K 31/685
4408011	11/1995	Germany	A61K 31/685
072294	7/1984	Japan	
1583661	1/1981	United Kingdom	A61K 31/66
93/04673	3/1993	WIPO	A61K 9/127
93/08202	4/1993	WIPO	C07H 15/04
94/27580	12/1994	WIPO	A61K 9/127

OTHER PUBLICATIONS

Bazill, et al., "Role of Endocytosis in the Action of Ether Lipids on WEHI-3B, HL60, and FEDCP-Mix A4 Cells", *Cancer Res.* 50: 7505 (1990).

Berdel, "Membrane-interactive lipids as experimental anti-cancer drugs", *Br. J. Cancer* 64: 208 (1991).

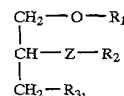
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[57] **ABSTRACT**

Described herein are liposomes containing etherlipids of the formula:



as well as a phosphatidylcholine, a sterol, and a headgroup-derivatized lipid. These liposomes are useful in a variety of therapeutic regimens, including the treatment of cancers and inflammatory disorders.

16 Claims, 3 Drawing Sheets

